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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/823,297 | 04/13/2004 | Takayuki Haze | LEPA122745 | 4560 |
| 26389 | 7590 | 09/18/2006 | EXAMINER | |
| CHRISTENSEN, O'CONNOR, JOHNSON, KINDNESS, PLLC 1420 FIFTH AVENUE SUITE 2800 SEATTLE, WA 98101-2347 | | | PERKINS, PAMELA E | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2822 | |

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/823,297

Applicant(s)

HAZE, TAKAYUKI

Examiner

Pamela E. Perkins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) 7-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

This office action is in response to the filing of the amendment on 30 June 2006.

Claims 1-9 are pending; claims 7-9 have been withdrawn from consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (KR 1020030072855) in view of Lei (7,008,867).

Lee et al. disclose a method of forming a bump pad of a flip chip including subjecting a surface of an insulating layer to electroless copper plating to prepare electroless copper plating layer, which is then coated with photosensitive material; exposing to light and developing the photosensitive material to prepare a resist pattern, which is then plated to form a second plating layer; and removing the resist pattern prepared at the second step and the electroless copper plating layer (constitution).

Lee et al. do not disclose subjecting a pulsing plating layer to electrolytic copper plating using direct current, to prepare a direct current plating layer.

Lei discloses a method of forming a bump pad of a flip chip including a subjecting a surface of an insulating layer (10) to electro-chemical copper plating to prepare a copper plating layer (16B) (col. 3, lines 42-62), which is then coated with photosensitive

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material; exposing to light and developing the photosensitive material to prepare a resist pattern (20) (col. 4, lines 3-10), which is then pulse plated to form a pulse plating layer (22); and subjecting the pulse plating layer (22) to electrolytic copper plating using direct current, to prepare a direct current plating layer (col. 4, line 11 thru col. 12, line 13).

Since Lee et al. and Lei are both from the same field of endeavor, a method of forming a bump, the purpose disclosed by Lei would have been recognized in the pertinent art of Lee et al. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lee et al. by subjecting a pulsing plating layer to electrolytic copper plating using direct current, to prepare a direct current plating layer as taught by Lei to improve the structural stability of the deposited copper (col. 4, lines 58-64).

Referring to claim 2, Lee et al. disclose the formation the electroless copper plating layer by subjecting the surface the insulating layer to electroless copper plating, and the coating of the photosensitive material on the electroless copper plating layer (constitution).

Referring to claim 4, Lee et al. disclose the photosensitive material coated electroless copper plating layer is a dry film (constitution).

Referring to claim 5, Lei disclose wherein the second step comprises formation of the resist pattern through exposure light and development of the photosensitive material, and the formation of the pulse plating layer by subjecting resist pattern electrolytic pulse plating (col. 4, lines 33-57).

Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Lei as applied to claim 1 above, and further in view of Wang et al. (5,519,177).

Lee et al. in view of Lei disclose the subject matter claimed above except the photosensitive material coated plating layer being 20 μm thick and wherein the pulse plating layer is 5-10 μm thick.

Wang et al. disclose a method of forming a bump pad of a flip chip including a first step of subjecting a surface of an insulating layer (2) to electroless copper plating to prepare electroless copper plating layer, which is then coated with photosensitive material (3); a second step of exposing to light and developing the photosensitive material to prepare a resist pattern, which is then pulse plated to form a pulse plating layer (Fig. 1c-1f; col. 14, lines 45-67).

Referring to claims 3 and 6, Wang et al. disclose the photosensitive layer and plating layer of claim 1 wherein the photosensitive layer may be 20 μm thick and the plating layer may be 25 μm thick (col. 14, lines 45-67). It would have been obvious to one having ordinary skill in the art at the time invention was made to form the photosensitive layer as 20 μm thick and the pulse plating layer as 5-10 μm thick disclosed in the claimed invention, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lee et al. by the photosensitive material coated plating layer being 20 μm thick and wherein the pulse plating layer is 5-10 μm thick as taught by Wang et al. to increase heat resistance and chemical stability (col. 2, lines 2-7).

Response to Arguments

Applicant's arguments, see the request for reconsideration, filed 30 June 2006, with respect to the rejection(s) of claim(s) 1-6 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Lei (US 7,008,867).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E. Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PEP
13 September 2006


Zandra V. Smith
Supervisory Patent Examiner
14 Sept. 2006